

Rapid Estimation of Aircraft Performance Models using Differential Vortex Panel Method and Extended Kalman Filter, Phase I

Completed Technology Project (2008 - 2008)



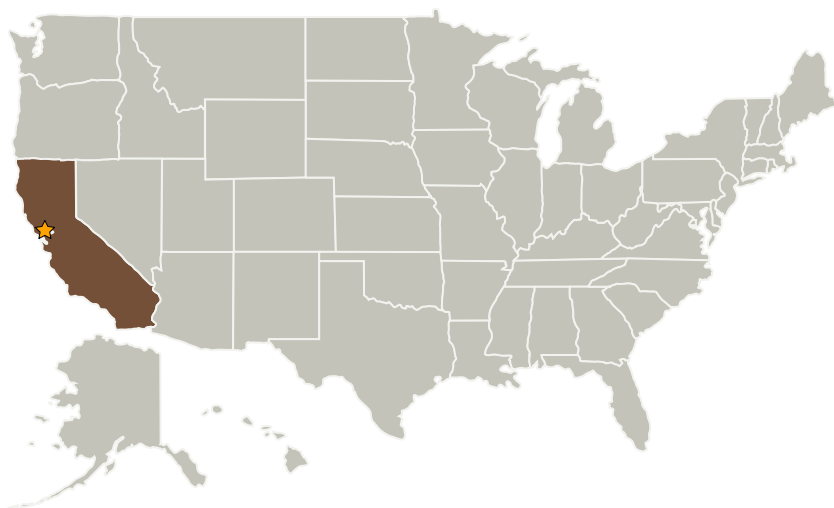
Project Introduction

Estimation of aerodynamic models for the control of damaged aircraft using an innovative differential vortex lattice method tightly coupled with an extended Kalman filter is proposed. The approach exploits prior knowledge about the undamaged aircraft to reduce the order of the estimation problem. Test maneuvers will be designed to improve the observability of the system dynamics. The derived performance model will then be used to determine the aircraft flight envelope, performance parameters and the maneuver limits. The objective is to develop an aircraft performance model online to permit the derivation of viable landing guidance laws for damaged aircraft. Phase I research will demonstrate the feasibility of the proposed concept using a NASA-supplied aircraft simulation. Complete aircraft performance estimation system will be developed during the Phase II research and evaluated in real-time, high-fidelity simulations.

Anticipated Benefits

Potential NASA Commercial Applications: The proposed research will provide a systematic methodology for the guidance and control of damaged aircraft. Algorithms and software developed under the proposed SBIR work will contribute towards improving the safety of military, commercial and general aviation aircraft operations.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
★ Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Optimal Synthesis, Inc.	Supporting Organization	Industry Small Disadvantaged Business (SDB)	Los Altos, California

Primary U.S. Work Locations

California

Project Transitions

▶ **January 2008:** Project Start

✓ **July 2008:** Closed out

Closeout Summary: Rapid Estimation of Aircraft Performance Models using Differential Vortex Panel Method and Extended Kalman Filter, Phase I Project Image

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

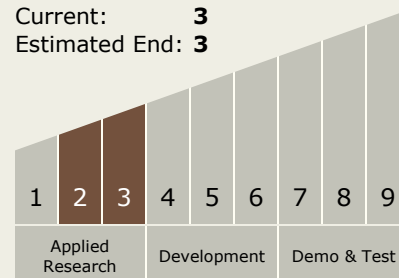
P. K. Menon

Technology Maturity (TRL)

Start: 2

Current: 3

Estimated End: 3



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Technology Areas

Primary:

- TX15 Flight Vehicle Systems
 - └ TX15.1 Aerosciences
 - └ TX15.1.3 Aeroelasticity